



Otala punctata (O.F. Müller, 1774) (Stylommatophora: Helicidae) in Italy

Otala punctata (O.F. Müller, 1774) (Stylommatophora: Helicidae) en Italia

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ABSTRACT

A living population of *Otala punctata* (O.F. Müller, 1774) has been found for the first time in Sardinia, Italy. In the island the species was previously recorded by several authors, but only finding badly preserved shells, often considered of doubtful origin. An anatomical and conchological description is given, and a comparison with other populations of the species and *O. lactea* (Müller, 1774) from the W-Mediterranean region is carried out. The species distribution is limited to a coastal sector of NW-Sardinia characterized by Mediterranean maquis and rural environments. Conservation status of the population is discussed, and its presumable origin from the Iberian peninsula through active human transportation is proposed.

RESUMEN

Una población viva de *Otala punctata* (O.F. Müller, 1774) se ha encontrado por primera vez en Cerdeña, Italia. Existen citas anteriores por parte de varios autores, pero sólo basadas en conchas mal conservadas y a menudo de procedencia dudosa. Se hace una descripción anatómica y conquiliológica, y se compara con otras poblaciones de la especie y con *O. lactea* (Müller, 1774) de la región W-Mediterráneo. La distribución de la especie se limita a un sector costero del noroeste de Cerdeña, un medio rural caracterizado por matorral mediterráneo. Se examina el estado de conservación de la población y se sugiere su presumible origen desde de la península Ibérica a través de transporte antrópico.

INTRODUCTION

In Italy *O. punctata* was recorded for the first time (as *Archelix apalopena* (Bourguignat, 1867)) by MALATESTA AND SETTEPASSI (1954) from Alghero (N-W Sardinia). Its presence in the same area has been confirmed later by CARRADA, PARISI AND SACCHI (1967). Significantly, both papers reported finding badly pre-

served shells only and no living specimen was ever found. Paulucci (1886) reported *O. lactea* (Müller, 1774) from the Tuscan Archipelago (Argentarola island). This record, based on a single, badly preserved shell, could be referred to *O. punctata*, but *Eobania vermiculata* (O.F. Müller, 1774) cannot be excluded

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(GIUSTI, 1976; BODON, FAVILLI, GIUSTI AND MANGANELLI, 1995).

O. punctata has a Western-Mediterranean distribution. It is found in north-west Algeria, eastern Spain and the Balears, south-western France and Malta (FALKNER, 1990; CLANZIG AND BERTRAND, 2001; FALKNER, RIPKEN, AND FALKNER, 2002; BARBARA AND SCHEMBRI, 2008). The species is widely raised in heliciculture and thus present also in North and South America, and South Africa (HERBERT AND SIRGEL, 2001; COWIE, DILLON, ROBINSON AND SMITH,

2009). The aim of this work is to clarify the Status of *Otala punctata* in Sardinia.

MATERIAL AND METHODS

The snails were killed in water and then fixed in 75% ethanol. Bodies were isolated from the shell and then dissected under an optical microscope. Anatomical details were drawn using a camera lucida. Empty shells were measured (n=20 for each population). The material is kept in the collections of the Authors.

RESULTS

Otala punctata (O.F. Müller, 1774)

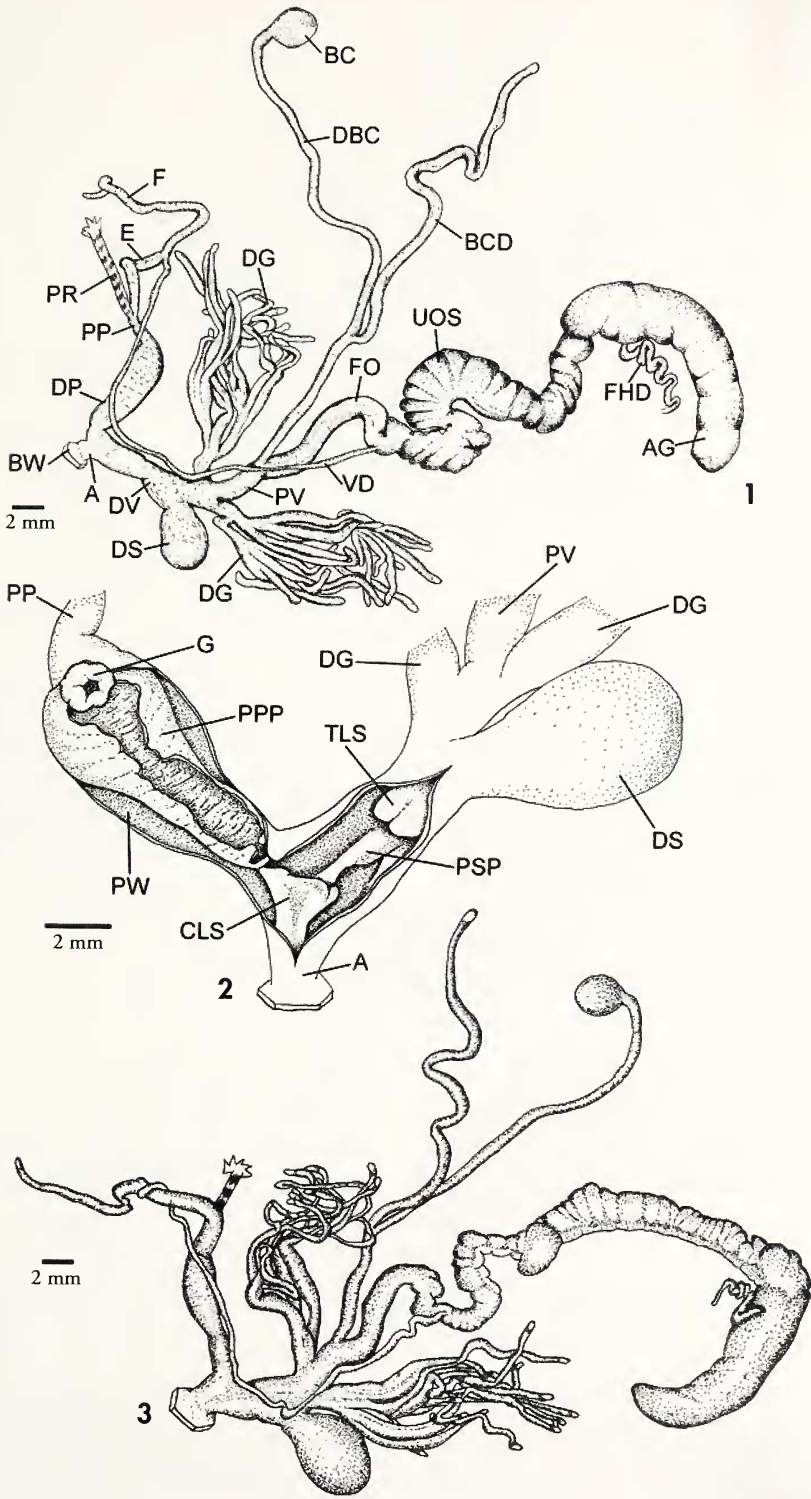
Material examined [dsp, dissected specimen(s)]. — Italy: Sardinia, Alghero, Sorgente Lu Cantar, 40° 32' 18" N 8° 19' 30" E, 30 m alt., 07. ii. 2008, 3 dsp. F. Mascia leg.; Sardinia, Alghero, Cala Bona, 20 m alt., 40° 32' 40" N 8° 19' 20" E, 07. ii. 2008, 2 dsp. F. Mascia leg.; Malta: Mosta, 80 m alt., 35° 54' 34" N 14° 25' 05" E, 17. i. 2010, 2 dsp, N. Barbara leg. Spain, Málaga, El Tarajal, 30 m alt., 36° 70' 20" N 4° 50' 23" E, 12. xi. 2008, 2 dsp., J.S. Torres leg.

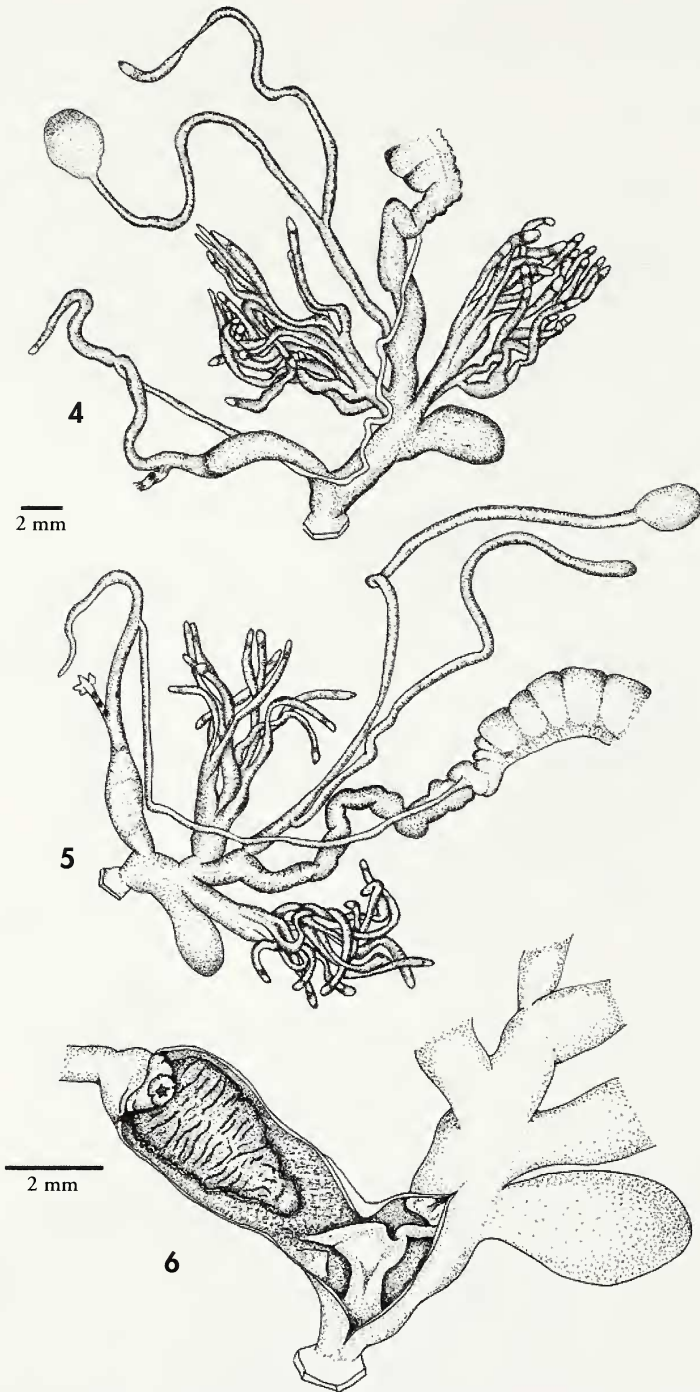
Shell (Figs 9-10): The protoconch is dark violet-brown to dark brown. The teleoconch is thick and robust, globose to subglobose, conical above and convex below. There are up to 5 main, dark brown to light brown, variably wide bands, which are fused with a superimposed pattern of whitish reticulation.

Sometimes the main bands abruptly fade becoming barely visible and the shell becomes almost uniformly creamy in colour. The polished external surface shows irregular, fine growth lines and very fine, dense spiral lines. The spire is conical and not much raised with 4-5 regularly growing whorls. The last

(Right page) Figures 1-3. *Otala punctata* (O.F. Müller, 1774). Italy: Sardinia, Alghero, Sorgente Lu Cantar. 1, 3: genitalia (ovotestis excluded); 2: inner walls of atrium and penis. Abbreviations, A: atrium; AG: albumen gland; BC: bursa copulatrix; BCD: diverticulum of the bursa copulatrix; BW: body wall; CLS: crest-like structure; DBC: duct of the bursa copulatrix; DG: digitiform glands; DP: distal penis; DS: dart sac; dsp: dissected specimen[s]; DV: distal vagina; E: epiphallus; F: flagellum; FHD: first hermaphrodite duct; FO: free oviduct; G: glans or penial papilla; PP: proximal penis; PPP: pseudo-penial papilla; PR: penial retractor muscle; PSP: pilaster-shaped pleat; PV: proximal vagina; PW: penial wall; TLS tongue-like structure; UOS: uterine ovispermiduct; VD: vas deferens.

(Página derecha) Figuras 1-3. *Otala punctata* (O.F. Müller, 1774). Italia: Cerdeña, Alghero, Sorgente Lu Cantar. 1, 3: órganos genitales (ovotestis excluido); 2: paredes internas del atrio y del pene. Abreviaturas, A: atrio; AG: glándula del albumen; BC: bursa copulatrix; BCD: divertículo de la bursa copulatrix; BW: pared del cuerpo; CLS: estructura en forma de cresta; DBC: conducto de la bursa copulatrix; DG: glándulas digitiformes; DP: pene distal; DS: saco del dardo; DV: vagina distal; E: epifalo; F: flagelo; FHD: primer conducto hermafrodita; FO: oviducto libre; G: glans o papila penial; PP: pene proximal; PPP: papilla pseudo-penial; PR: músculo retractor penial; PSP: pliegue en forma de pilastra; PV: vagina proximal; PW: pared del pene; TLS estructura linguiiforme; UOS: oviépermiducto uterino; VD: vas deferens.





Figures 4-6. *Otala punctata* (O.F. Müller, 1774). 4: Spain, Málaga, El Tarajal, genitalia (ovotestis excluded); 5, 6: Malta, Mosta; 5: genitalia (ovotestis excluded); 6: inner walls of atrium and penis.
Figures 4-6. *Otala punctata* (O.F. Müller, 1774). 4: España, Málaga, El Tarajal, genitalia (ovotestis excluído); 5, 6: Malta, Mosta; 5: genitalia (ovotestis excluído); 6: paredes internas del atrio y del pene.

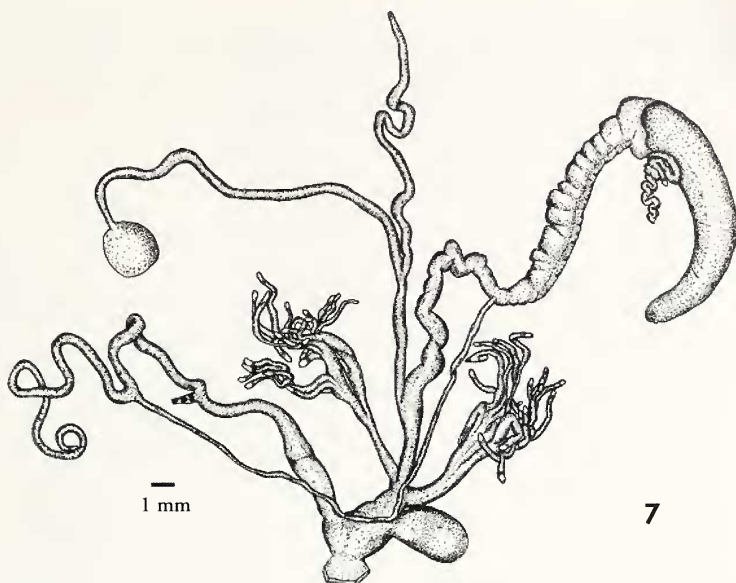


Figure 7. *Otala lactea* (Müller, 1774). Spain, Menorca, Mahon, genitalia (ovotestis excluded).

Figura 7. *Otala lactea* (Müller, 1774). España, Menorca, Mahón, órganos genitales (ovotestis excluido).

whorl is very large (70% of shell height), well rounded and markedly descending where approaching the aperture. The sutures are moderately deep and the umbilicus is closed. The aperture is markedly oblique and oval. The peristoma is interrupted, thick and reflected and is whitish in colour. A columellar tooth, more or less evident, is often present. The columellar part of aperture, palatum and parietum are always dark brown in colour.

Diagnostic characters of genitalia (Figs 1-6): Proximal part of the vagina with two digitiform glands. Each gland consists of a short base which bifurcates into three or four main branches. Each main branch gives rise to numerous long digitiform appendices. A single, very large dart-sac enters about midway along the vagina. The dart-sac contains a single, straight long dart with four lateral wings and a spear-like head; it opens into the vagina with a tongue-like structure. Along the inner wall of vagina there is a huge pilaster-shaped pleat which reaches the large crest-like structure in the atrium. A moderately short

copulatory (5-7 mm) duct divides into a diverticulum of bursa copulatrix and a duct of bursa copulatrix. Diverticulum and duct have almost the same length. The bursa copulatrix is usually oval or round. The vagina enters the atrium side by side with the penis. A moderately short (8-10 mm) penial flagellum arises where the vas deferens enters the penial complex. A rather short epiphallus (6-8-mm) enters the penis (8-10 mm) where the penial retractor meets the penial wall. The penis has a proximal widened portion (almost twice as long as the distal) and enveloped in a thin penial sheath. The short penial papilla is surrounded by a solid and long pseudo-penial papilla with a grooved surface.

Dimensions of Sardinian specimens: Shell diameter: 29 ± 1.7 mm (range: 27 - 32 mm) Shell height: 18 ± 1.1 mm (range: 16-20 mm) (average value \pm standard deviation).

Anatomical and conchological investigation allowed to easily distinguish *Otala punctata* from *O. lactea* (Müller, 1774) and *Eobania vermiculata*. *Otala lactea* has a smaller shell (average diam-

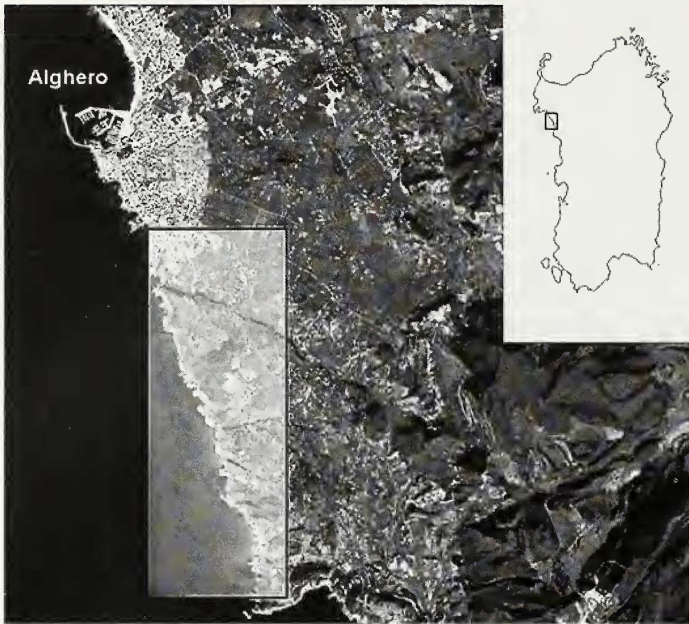


Figure 8. Distribution of *Otala punctata* (Müller, 1774) in Sardinia, Italy.

Figura 8. Distribución de *Otala punctata* (Müller, 1774) en Cerdeña, Italia.

eter of 20 mm) and the inner part of the aperture (peristome, parietum and palatum) is uniformly dark brown in colour (Fig. 11). *E.vermiculata* has a spire somewhat more elongated and the inner part of the aperture is uniformly creamy white in colour (BODON ET AL., 1995). *Eobania vermiculata* and *O. lactea* can be easily distinguished from *O. punctata* by the anatomy of the genitalia. *Eobania vermiculata* has a much longer flagellum and vagina, while the free oviduct is markedly shorter. The diverticulum of the bursa copulatrix is 6-10 times longer than the duct of bursa copulatrix. On the distal penis, a slender false penial papilla is present, which originates from the penial wall and does not surround the penial papilla. *Otala lactea* can be distinguished mainly in virtue of the much longer epiphallus and penial flagellum (Fig. 7).

The present investigation allows us to confirm the presence of *O. punctata* in Italy. The species occurs exclusively in the southern surroundings of the town of Alghero (Sassari, Sardinia), along the

southern rocky shore area of the town (Fig. 8), from sea level to 40 meters in altitude. Population cover an area of approximately 0.4 km². In the same area, the population density of *Eobania vermiculata* (O.F. Müller, 1774) and *Cornu aspersum* (O.F. Müller, 1774) is markedly higher than that of *O. punctata*. This area belongs to the Mediterranean upper thermomediterranean thermotype (BACCHETTA, BAGELLA, BIONDI, FARRIS AND FILIGHEDDU, 2009). Geologically the area is characterized by marine and continental Quaternary deposits (BARCA, CARMIGNANI, OGGIANO, PERTUSAT, SALVADORI, CONTI, ELTRUDIS, FUNEDDA AND PASCI, 1996) and is mainly covered by Mediterranean coastal maquis, belonging to the western-Sardinian, calcicole, thermomediterranean *Chamaerops humilis-Juniperetum turbinatae* (BACCHETTA ET AL., 2009; BIONDI, FILIGHEDDU AND FARRIS, 2001; BLASI, ANGIUS AND BACCHETTA, 2009). Mediterranean coastal maquis alternates with rural landscape principally represented by grazing fields and cultivated lands.



Figures. 9-11. Shells of *Otala* spp. 9-10, *Otala punctata* (O.F. Müller, 1774). 9: Sardinia, Alghero, Sorgente Lu Cantar; 10: Spain, Málaga, El Tarajal; 11: *Otala lactea* (Müller, 1774), Spain, Menorca, Mahon.

Figures. 9-11. Shells of *Otala* spp. 9-10, *Otala punctata* (O.F. Müller, 1774). 9: Cerdeña, Alghero, Sorgente Lu Cantar; 10: España, Málaga, El Tarajal; 11: *Otala lactea* (Müller, 1774), España, Menorca, Mahón.

DISCUSSION

CARRADA ET AL. (1967) stressed the presence of fossil shells of *O. punctata* in travertines from Alghero but this has not been confirmed. Preliminary field research revealed that in the surroundings of Alghero, quaternary deposits do not show the presence of *O. punctata*. BALDINO, CARENTI, GRASSI, ORGOLESU, SECCHI AND WILKENS (2008) and WILKENS (2004) did not cite the species from the archaeological sites of north-western Sardinia. Also PAULUCCI (1882) did not mention for *O. punctata* in Sardinia.

Most probably *O. punctata* is not autochthonous to Sardinia. The introduction of *O. punctata* could be referred to the Aragonese occupation during the 14th. The traditional local denomination of this species, which is "Caragol español" (Spanish snail), could support the hypothesis. Nowadays snail farming is a common practice in Sardinia, but not in the surroundings of Alghero. In the island *O. punctata* and *O. lactea* were commonly used for heliciculture in the past, but less frequently at present.

The population of *O. punctata* shows a very low density of specimens which

could be referred to its alien origin. Probably a feeding competition occurs with the native syntopic Helicidae species, such as *Cantareus apertus* (Born, 1778), *Cornu aspersum* (O.F. Müller, 1774) and *Eobania vermiculata* (O.F. Müller, 1774). Moreover, because of its culinary interest, the species is frequently collected by people. The very limited distribution of *O. punctata* is a clear risk factor. Destruction of habitat by city expansion, mostly related to tourism facility development and collecting as a food item represent the main threats. Further

investigations are actually in progress in order to clarify the origin of the Sardinian population of *O. punctata*.

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